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# A scaffold membrane approach of constructing a tubular scaffold for small-diameter tissue-engineered vascular grafts

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Based on a postulate that the microstructure of a scaffold can influence that of the resulting tissue and hence its mechanical behavior, we fabricated a small-diameter tubular scaffold (~3 mm inner diameter) that has a similar microstructure to the arterial media using a scaffold membrane approach. Scaffold membranes that contain highly aligned fibers were fabricated by collecting electrospun poly([epsilon]-caprolactone) fibers on a grounded rotating drum. Membranes were then wrapped around a small-diameter mandrel to form the tubular scaffolds. Particularly, the tubular scaffolds with three different off-axis fiber angles (30, 45, and 60 degree) were formed using the membranes. These scaffolds were subjected to biaxial mechanical testing to examine the effects of fiber directions on their mechanical properties. The circumferential elastic modulus of the tubular scaffold was closely related to the fiber directions; the larger the off-axis fiber angle the greater the circumferential elastic modulus. Similar to cell sheet-based vascular tissue engineering, tubular cell-seeded constructs were prepared by wrapping cell-seeded scaffold membranes, alleviating the difficulty associated with cell seeding in electrospun scaffolds. Histology of the construct illustrated that cells were aligned to the fiber directions in the construct, demonstrating the potential to control the microstructure of tissue-engineered vascular grafts using the electrospun scaffold membrane.

## Biography

Jin-Jia Hu received his Ph.D. degree in Biomedical Engineering at Texas A&M University. He is currently an Assistant Professor in Department of Biomedical Engineering at National Cheng Kung University. His research interest focuses on mechanobiology, soft tissue biomechanics and soft tissue engineering.

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